

DESCRIPTIONS OF NEW SPECIES AND COMBINATIONS  
IN ERIOGONUM (POLYGONACEAE)

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During the course of a preliminary revision of the genus *Eriogonum* (Polygonaceae), a number of new combinations were found necessary, and a few undescribed entities were discovered. For the most part these new taxa and combinations will remain unpublished awaiting a final monograph. Others, however, must be made at this time in connection with various floristic projects in the western United States.

*Eriogonum ammophilum* Reveal, spec. nov.

*Eriogono hearneyi* Tidestr. affinis sed caulibus glabris, foliis satis basalibus et latioribus, et pedunculis obviis; a *E. nummulari* M.E. Jones foliis non rotundis et caulibus non lanatis differt.

*Fruticuli* 2-4 dm alti ex caudicibus subterraneis; *folia* dispersa secus caules ad basim, laminis ellipticis vel late ellipticus, 1-2.5 (2.8) cm longis et 8-17 mm latis, subtus albo-tomentosis, supra subglabris et viridibus, petiolis 1-5 (15) mm longis, basibus expansis petiolorum 1.5-2 mm longis et 1-1.5 mm latis, tomentosis; *caules* glabri, 5-15 cm longi; *inflorescentiae* cymosae, glabrae, 1-2.5 mm longae; *pedunculi* glabri, (2) 5-10 (12) mm longi et erecti; *involucra* solitaria, turbinata, (2.5) 3-3.5 mm longa et 2-2.5 mm lata, glabra, lobis 5, acutis, 0.4-0.8 mm longis, bracteolis linearibus vel oblanceolatis, 1.5-2 mm longis, pedicellis glabris, 2.5-4 mm longis; *flores* albi, 2-3 mm longi, glabri, tepalis + similaribus, anguste obovatis, (0.5) 1-1.7 mm latis; *stamina* exserta, 2.5-3.5 mm longa, filamentis parce puberulis, antheris roseis vel purpureis, 0.5-0.6 mm longis; *achaeis* ignota.

Low herbaceous subshrubs, erect and spreading, 2-4 dm high, 2.5 dm across, the caudices woody, brown, deeply buried in sand, leafless, the upper branches herbaceous, thin, glabrous and glaucous; *leaves* solitary, alternate and rather closely congested along the lower part of the branches just above the level of the sand, the leaf-blade elliptic to broadly elliptic, 1-2.5 (2.8) cm long, 8-17 mm wide, densely white-tomentose below, less so to subglabrous and green above, the base obtuse, the apex obtuse to rounded, the leaves soon deciduous, the plants leafless at matur-

ity, the petiole slender, 1-5 (15) mm long, lanate to tomentose, the petiole-base triangular, 1.5-2 mm long, 1-1.5 mm wide, lanate or nearly so; *flowering stems* slender, few to several per plant, 5-15 cm long, glabrous and glaucous, lanate amongst the leaves below; *inflorescences* cymose, trichotomous at the first node, dichotomous above, 5-20 cm long, up to 25 cm across, open, glabrous and glaucous; *bracts* ternate, scale-like, 1-2.5 mm long, 1-2 mm wide, triangular, glabrous without, tomentose within, connate at the base; *peduncles* slender and erect, (2) 5-10 (12) mm long, glabrous and glaucous; *involucres* solitary, turbinate, (2.5) 3-3.5 mm long, 2-2.5 mm wide, glabrous within and without, the 5 acute teeth 0.4-0.8 mm long, the bractlet linear to oblanceolate, 1.5-2 mm long, sparsely fringed with short capitate gland-tipped cells, white, the pedicel glabrous, 2.5-3 mm long; *flowers* white with a reddish-brown midrib and base, 2-3 mm long, glabrous within and without except for a few microscopic glands scattered along the midribs within, the tepals slightly dissimilar, the outer whorl of tepals 1-1.7 mm wide, the inner whorl of tepals narrower, 0.5-0.9 mm wide, united only at the base; *stamens* slightly exserted, 2.5-3.5 mm long, the filament sparsely puberulent basally, the anther red to purple, 0.5-0.6 mm long, oblong; *achenes* unknown.

TYPE: About 1.3 miles northwest of Ibex Warm Point on a dry sandy flat associated with *Tetradymia*, *Oryzopsis* and *Ceratoides* [= *Eurotia*], T.22S., R.14W., sec. 30, at 5270 feet elevation, Millard Co., Utah, 4 August 1970, Holmgren & Holmgren 4650. Holotype: US! Isotypes: BRY, NY, UTC!

ADDITIONAL SPECIMENS SEEN: UTAH: Millard Co.: Ibex Range Exclosure just south of Ibex Warm Point on a sandy flat, T.22S., R.14W., sec. 32, 19 June 1965, R.C. Holmgren 479 (BRY, NY, USFS, UTC).

*Eriogonum ammophilum* is a low herbaceous subshrub similar to *E. kearneyi* Tidestr. and *E. nummulare* M.E. Jones. It resembles, and is technically most closely related to, the Kearney Buckwheat in its habitat, leaves and open inflorescence, but it is not as woody in the above-ground parts as is typical of *E. kearneyi*. In this respect, the new species approaches the rare, western Utah species, *E. nummulare*. They share a similar inflorescence structure and other features such as leaf pubescence type. However, the two differ in shape and structure of the leaves, flowers and stem vesture. As now seen, *E. ammophilum* represents an end line in the evolutionary development of a small group of species typified by *E. leptocladon* Torr. & Gray.

These species may be separated as follows:

- A. Leaves linear-lanceolate to narrowly oblanceolate, 1.5-4.5 cm long, 3-6 mm wide; branches tomentose or glabrate and floccose; flowers white or yellow; sandy deserts, Emery Co., Utah

- southward to Coconino Co., Arizona, eastward into southwestern Colorado and northwestern New Mexico..... *E. leptocladon*
- AA. Leaves oblanceolate to elliptic or orbicular to rounded, 0.5-2.5 (3) cm long, 5-15 mm wide; flowers white.
- B. Leaves oblanceolate to elliptic, 1-2.5 (3) cm long.
- C. Stems and inflorescences tomentose, rarely glabrate; leaves scattered along the lower stems; involucre sessile, 2-2.5 mm long; common in western Utah from Tooele Co. southward to northern Mohave Co., Arizona, westward across southern and central Nevada to Washoe Co., entering California in Mono Co. and extending southward into Owens Valley of Inyo Co. *E. kearneyi*
- CC. Stems and inflorescences glabrous and glaucous; leaves densely clustered near the base of the stems; involucre peduncled, at least in the forks of the branches, the peduncle (2) 5-10 (12) mm long, the involucre (2.5) 3-3.5 mm long; local and infrequent, near Ibex Warm Point, Millard Co., Utah..... *E. amophilum*
- BB. Leaves orbicular to rounded, 0.5-1 cm long and wide, clustered at the base of the stems, densely white-tomentose on both surfaces; stems densely lanate; involucre short peduncled, the peduncles up to 1 cm long; rare, known only from sandy areas in extreme western Juab and Tooele cos., Utah..... *E. nummular*

*Eriogonum eremicum* Reveal, spec. nov.

*Eriogono ostlundii* M.E. Jones affinis sed foliis ovatis vel rotundis, subtiliter tomentosis, laminis 1.2-2 cm longis et 1-1.7 cm latis, involucris plerumque congestis, 2.5-4 mm longis.

*Plantae* herbaceae perennes 2.5-4.5 dm altae et caudicibus; *folia* basalia, laminis ovatis vel rotundis, 1.2-2 cm longis et 1-1.7 cm latis, subtiliter albo-tomentosis, basi rotundis vel truncatis, petiolis 1-2.5 cm longis, tomentosis, basibus expansis petiolorum 2-3 mm longis et latis, tomentosis; *caules* glabri, 5-20 cm longi; *inflorescentiae* cymae, glabrae, 12-25 cm longae; *bractae* ternariae, glabrae, 1-3 mm longae; *pedunculi* nulli; *involucre* plerumque congesta, 2.5-4 mm longa et 2-2.5 mm lata, lobis 5, rotundis vel acutis, 0.4-0.8 mm longis, bracteolis linearibus, 1.5-3 mm longis, pedicellis 2.5-4 mm longis, glabris; *flores* albi, 2.5-3 mm longi, tepalis similaribus, obovatis, 0.8-1.5 mm latis; *stamina* exserta, 2.5-3.5 mm longa, filamentis parce puberulis, antheris rubris, 0.5-0.6 mm longis; *achaenia* 3 mm longa.

Spreading herbaceous perennials 2.5-4.5 dm high and 1-2.5 dm across, with short woody, somewhat congested, caudex branches 5-10 cm across, arising from a slender woody taproot; leaves strictly

basal, the leaf-blade ovate to round, 1.2-2 cm long, 1-1.7 cm wide, finely tomentose on both surfaces, the apex rounded, the base rounded to truncate, the margin entire and plane, the petiole 1-2.5 cm long, tomentose, the petiole-base triangular, 2-3 mm long and wide, tomentose to floccose without, subglabrous to glabrous within; *flowering stems* erect, 5-20 cm long, glabrous and green, remaining pubescent amongst the leaves at the very base; *inflorescences* cymose, 12-25 cm long, 1-2 dm across, divided several times, trichotomous at the lower nodes, dichotomous above, the crown open, glabrous; *bracts* ternate, scale-like, 1-3 mm long, 0.8-1.3 mm wide, narrowly triangular, glabrous without, sparsely tomentose within, connate at the base; *peduncles* lacking; *involucres* solitary or more frequently clustered, turbinate, 2.5-4 mm long, 2-2.5 mm wide, glabrous within and without, the 5 rounded to acute teeth 0.4-0.8 mm long with a membranous margin, the bractlet linear, fringed with minute gland-tipped cells, 1.5-3 mm long, the pedicel 2.5-4 mm long, glabrous; *flowers* white with a reddish-brown to greenish midrib and base, 2.5-3 mm long, glabrous within and without except for minute glands along the midrib within, the tepals essentially similar, obovate, 0.8-1.5 mm wide, the inner whorl of tepals slightly narrower, united less than 1/5 the length of the flower; *stamens* slightly to long exerted, 2.5-3.5 mm long, the filament sparsely pubescent basally, the anther red to rose, 0.5-0.6 mm long, oblong; *achenes* light brown, 3 mm long, the broadly globose base tapering to a long 3-angled beak.

TYPE: Common on scattered low sagebrush, *Atriplex* and *Oryzopsis* covered hills on gravelly soil, 17 miles southeast of Garrison, Millard Co., Utah, along Utah Highway 21, at 5650 feet elevation, 23 July 1965, *Holmgren*, *Reveal & LaFrance* 2247. Holotype: UTC! Isotypes: ARIZ, BRY, CAS, GH, MO, NY, OKL, RM, RSA, UC! -- Distributed under the name *Eriogonum batemanii* M.E. Jones.

ADDITIONAL SPECIMENS SEEN: UTAH: Millard Co.: Antelope Valley, 21 August 1967, *Alder* 73 (BRY, DRES<sup>1</sup>, USFS); West of Wa Wa, 26 June 1906, M.E. Jones s.n. (DS, NY, PH, POM, US); 2 miles west of Cowboy Pass, 8 August 1941, *Maguire* 21228 (GH, NY, UC, UTC, WTU); 25 miles southeast of Garrison on low limestone hills, along Utah Highway 21, 6200 feet elevation, 28 July 1971, *Reveal* 2544 (NY, US, UTC); 10 miles east of Robinson's Ranch, 1 August 1963, *Welsh & Moore* 2251 (BRY).

This new species has been known for some time, being first collected by Marcus E. Jones in 1906 and irregularly rediscovered by various people associated with the United States Forest Service and the Desert Range Experiment Station in Millard Co., Utah. It is well isolated and separated from its two most closely related

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<sup>1</sup>DRES stands for the Desert Range Experiment Station, U.S. Forest Service, Milford, Utah.

species, *Eriogonum ostlundii* and *E. batemanii*, both originally described by Jones in 1903.

*Eriogonum batemanii* is a wide spread species found in the Colorado-Green river drainage system of eastern Utah and adjacent western Colorado. Its range extends from the foothills of the Uinta Mountains in the north, south to the Henry Mountains of Garfield Co., Utah, and then eastward into Moffatt and Rio Blanco cos., Colorado. It is similar to *E. eremicum* in the clustered involucre, glabrous stems and strictly basal leaves. The two differ in leaf shape and size, the type of the tomentum, the flower length and general ecology of the sites - with *E. batemanii* most frequently being found on clay soils while *E. eremicum* is encountered mainly on gravelly limestone soils.

The relatively restricted *Eriogonum ostlundii* occurs among pines (both *Pinus ponderosa* and *P. edulis*) and sagebrush along the Sevier River drainage of Piute and Sevier cos., Utah. It is clearly related to *E. eremicum*, but the two differ in numerous subtle ways in both ecology and morphology. They differ in leaf shape, involucre size and number in any given cluster, flower length and the branching pattern of the inflorescence.

These three species, plus the recently described *Eriogonum cronquistii* Reveal, all belong to a small group of species found primarily in Utah. They may be distinguished as follows:

- A. Leaves elliptic to spatulate, densely white-tomentose below, floccose and green above, or if tomentose on both surfaces, then plants of eastern Utah; leaf-blades tapering to the petioles.
- B. Involucres 2-2.5 mm long, not clustered; leaf-blades 1-1.5 cm long, elliptic to spatulate; inflorescences with numerous, thin, branches making up more than half the height of the plant; flowers 1.5-2.3 mm long; peduncles, when present, up to 1 cm long, erect; rocky slopes and clay foothills and flats, Piute and Sevier cos., central Utah.  
..... *E. ostlundii*
- BB. Involucres 2.5-4 mm long, usually clustered; eastern Utah and adjacent western Colorado.
- C. Leaves not crenulate, the leaf-blade (1.5) 2-4 cm long, elliptic; plants 2-4 dm high, compact, not at all spreading; flowers 1.5-2.8 mm long; peduncles lacking; clay slopes, mounds and washes, Duchesne and Uintah cos. southward into Garfield Co., Utah, hence eastward into western Colorado..... *E. batemanii*
- CC. Leaves crenulate, the leaf-blade 0.5-2 cm long, elliptic; plants (0.7) 1-1.5 (2) dm high, spreading;

flowers (1.5) 2-3 mm long; peduncles lacking; steep talus slopes, Bull Mountain, Henry Mountains, Garfield Co., Utah..... *E. cronquistii*

- AA. Leaves nearly rotund to ovate, densely white-tomentose on both surfaces, the leaf-blade 1.2-2 cm long, 1-1.7 cm wide, not tapering to the petiole; plants 2.5-4.5 dm high, the inflorescence less than half the height of the plant; flowers 2.5-3 mm long; peduncles lacking; involucre 2.5-4 mm long; dry slopes and rocky hillsides in gravelly limestone places of western Millard Co., Utah..... *E. eremicum*

*Eriogonum argophyllum* Reveal, spec. nov.

A *Eriogono kingii* S. Wats. differt foliis 4-8 mm longis et 2-5 mm latis, albo-tomentosis, petiolis 0.5-1 (1.5) mm longis, scapis gracillimis, (4) 5-7 cm longis, involucris 2-2.5 mm longis, floribus luteis, 2.5-3 mm longis, tepalis oblongis.

*Plantae* humiles compactae perennes crassas tegetes formantes; *folia* oblanceolata vel elliptica, 4-8 mm longa, 2-5 mm lata, dense utrinque albo-tomentosa, petiolis 0.5-1 (1.5) mm longis, tomentosis, basibus expansis petiolorum 1-3 mm longis et 1-2.5 mm latis; *scapi* erecti, gracillimi, (4) 5-7 cm longi, floccosi; *bracteae* lanceolatae, 2-2.5 mm longae, membranaceae, sparse floccosae, 5-6; *involucrea* membranacea, 5-7, 2-2.5 mm longa, lobis lanceolatis, 6-7, extra sparse tomentosis et glandulosis, intra glandulosis, bracteolis lineari-lanceolatis, 0.8-1.3 mm longis, pedicellis glabris, 1.5-2.5 mm longis; *flores* lutei, 2.5-3 mm longi, sparse glandulosi extra secus costum, intus glandulosi, tepalis subaequalibus, oblongis; *stamina* exserta, filamentis 3-3.5 mm longis, sparse puberulis, antheris luteis; *achaeia* 2.8-3 mm longa.

Low compact caespitose herbaceous perennials forming a thick spreading mat with numerous, spreading, woody caudex branches, these densely covered with old persistent leaves and petiole-bases over much of their length, arising from a slender, woody, brownish taproot; *leaves* basal, the leaf-blade oblanceolate to elliptic, 4-8 mm long, 2-5 mm wide, densely white-tomentose on both surfaces, not glandular, the margin entire and plane, the petiole short, 0.5-1 (1.5) mm long, densely tomentose, the petiole-base elongate-triangular, 1-3 mm long, 1-2.5 mm wide, sparsely pubescent with long white hairs without, glabrous within, membranous and ± papery, light brown; *flowering stems* scapose, (4) 5-7 cm long, floccose, erect and very slender; *inflorescences* capitate, the head 5-10 mm across; *bracts* 5-6, lanceolate, 2-2.5 mm long, sparsely floccose, membranous, connate at the base; *peduncles* lacking; *involucres* congested, 5-7 per head, membranaceous, turbinate-campanulate, 2-2.5 mm long, sparsely tomentose especially at the apex without and with scattered glands along the ribs, minutely glandular within and often along the inner margin of the tube, the 6-7 lanceolate, acutish lobes 1-1.5 mm long, the lobes



and involucre tube totally hyaline, the bractlet linear-lanceolate, 0.8-1.3 mm long, the pedicel 1.5-2.5 mm long, glabrous; flowers yellow with a greenish-yellow midrib and base, becoming tinged with reddish-brown at maturity in some, 2.5-3 mm long, sparsely glandular on the midribs without, glandular within especially along the midribs, the tepals subequal, oblong, the outer whorl 1-1.2 mm wide, the inner whorl 0.6-0.8 mm wide, united about 1/3 the length of the flower; stamens exserted, 3-3.5 mm long, the filament sparsely puberulent basally, the anther yellow, 0.5-0.6 mm long, oblong; achenes brown, 2.8-3 mm long, the globose base tapering to a long, 3-angled beak.

TYPE: Common in sandy washes on crusty mineralized sand with *Senecio* below Sulphur Hot Springs, Ruby Valley, Elko Co., Nevada, near Nevada Highway 11, 16.8 miles southwest of the junction with U.S. Highway 93, T.31N., R.59E., sec. 11, at 6050 feet elevation, 7 July 1969, Holmgren & Kern 3661. Holotype: US! Isotypes: BRY, NY, UTC!

ADDITIONAL SPECIMENS SEEN: NEVADA: Elko Co.: Sulphur Hot Springs, 20 June 1941, A.H. Holmgren 1151 (NY, UTC); Sulphur Hot Springs, 18 July 1971, Reveal & Reveal 2527 (BRY, NY, US, UTC).

One of the more fascinating features of *Eriogonum* is the role isolation has played in the development of species. Occasionally the isolation barrier is geographic, where great distances have separated entities and allowed them to develop independently of each other along pathways which may be similar (no doubt due to a relatively high percentage of similar genes) or quite different due to the differences in selective pressures. This type of endemism is seen in *E. gracilipes* S. Wats. of the White Mountains of California and Nevada, and in *E. holmgrenii* Reveal, a species that is restricted to the Snake Range of eastern Nevada. In this case the morphological differences are not great, but the differences are consistent and definable. In the insular endemics off the coast of California and northern Mexico, *E. giganteum* S. Wats., *E. zapatoense* Moran and *E. molle* Greene, here the morphological differences are well pronounced, their geographical isolation well enhanced, and yet some of these species can hybridize when brought together in the garden.

Another feature of endemism in *Eriogonum* is that determined by edaphic specialization. A clear example of this is seen between *E. batemanii* and *E. eremicum* as noted above. However, there is still a touch of spatial isolation here. Some species are highly restricted in their distribution by the nature of the soil they occur on. *Eriogonum saurinum* Reveal is found only on Mowry Shale in Dinosaur National Monument of extreme northeastern Utah and adjacent Colorado. This vertical band of resistant rock is only a few feet wide, and the species is not known to occur off of this substrate.

In the case of *Eriogonum argophyllum*, both edaphic and spatial isolation have played a role in the evolution of this species. It is restricted to crusted mineralized sandy soil below Sulphur Hot Springs at an elevation around 6050 feet. Its most closely related species, *E. kingii* S. Wats., occurs less than 5 airline miles away, but at an elevation of from 9000 to 10,400 feet atop the East Humboldt Range and Ruby Mountains. Even given this short distance, the two have evolved a number of morphological differences, and these are of such a nature as to require a specific rank to place each. At the upper elevations where *E. kingii* is found, it covers large areas of the slopes usually in association with sagebrush, but with an occasional population venturing out onto exposed ridges as near Angel Lake west of the town of Wells. *Eriogonum argophyllum* occurs on more exposed situations, but at a lower elevation; even so, the overall nature of the plants is similar.

The two species are easily distinguished on technical features as noted in the key which follows the next species description.

*Eriogonum scopulorum* Reveal, spec. nov.

A *Eriogono chrysopsidi* Rydb. foliis (5) 6-9 (10) mm longis et 2.5-4 mm latis, tomentosis et glandulosis, petiolis 2-4 mm longis, scapis (3) 5-7 cm longis, glandulosis, involucris 2.5-3 mm longis, glandulosis et parce tomentosis, floribus stramineis, 2.5-3 (3.5) mm longis, tepalis oblanceolatis differt.

*Plantae* humiles compactae perennes crassas tegetes formantes; *folia* oblanceolata vel elliptica, (5) 6-9 (10) mm longa, 2.5-4 mm lata, albo-tomentosa et glandulosa, petiolis 2-4 mm longis, tomentosis et glandulosis, basibus expansis petiolorum 3-4 mm longis et (1.5) 2-2.5 mm latis; *scapi* erecti, gracillimi, (3) 5-7 cm longi, glandulosi; *bracteae* triangulares, 1.3-1.6 mm longae, membranaceae, sparse floccosae et glandulosae, 5-6; *involucra* membranacea, 5-7, 2.5-3 mm longa et lata, lobis 5-6, acutis, extra glabris vel sparse tomentosis et glandulosis, intra fere glabris, bracteolis linearibus, 1-1.5 mm longis, pedicellis glabris, 2.5-4 mm longis; *flores* straminei, 2.5-3 (3.5) mm longi, glabri, tepalis similaribus, oblanceolatis; *stamina* exserta, filamentis 3-4 mm longis, sparse pilosis, antheris luteis; *achaeia* 2.5 mm longa.

Low compact caespitose herbaceous perennials forming a thick spreading mat with few to several, spreading, woody caudex branches, these not densely covered with old leaves or petiole-bases, arising from a slender, woody taproot; *leaves* basal, the leaf-blade oblanceolate to elliptic, (5) 6-9 (10) mm long, 2.5-4 mm wide, densely white-tomentose below, slightly less so and more greenish above, glandular, the margin entire and plane, the petiole short, 2-4 mm long, tomentose and glandular, the petiole-



base narrowly triangular, 3-4 mm long, (1.5) 2-2.5 mm wide, thinly tomentose without, glabrous within, membranous and papery, light brown to tan; *flowering stems* scapose, (3) 5-7 cm long, glandular, erect and very slender; *inflorescences* capitate, the head 1-1.5 cm across; *bracts* 5-6, triangular, 1.3-1.6 mm long, sparsely floccose and glandular without, glabrous within, connate at the base; *peduncles* lacking; *involucres* congested, 5-7 per head, membranaceous, turbinate-campanulate, 2.5-3 mm long and wide, glabrous without except for scattered glands near the teeth, or sparsely floccose and glandular near the teeth and along the ribs, sparsely pubescent within along the teeth, otherwise glabrous, the 5-6 acute teeth 1-1.5 mm long, the bractlet linear, 1-1.5 mm long, fringed with elongated, white to hyaline cells and marginal glands, the pedicel 2.5-4 mm long, glabrous; *flowers* pale yellow with a greenish midrib and base, becoming tinged with pink in some at maturity, 2.5-3 (3.5) mm long, glabrous within and without except for scattered glands along the midribs within, the tepals essentially similar, oblanceolate, 1-1.4 mm wide, the apex emarginate especially in fruit, united less than 1/5 the length of the flower; *stamens* slightly exserted, 3-4 mm long, the filament sparsely pilose basally, the anther pale yellow, 0.5-0.6 mm long, oblong; *achenes* brown, 2.5 mm long, the globose base tapering to a long, 3-angled beak.

TYPE: Among granite rocks near the top of a ridge south of Aneroid Lake near the source of the East Fork of the Wallowa River, Wallowa Mountains, Wallowa Co., Oregon, T.4S., R.45E., sec. 21, at 8500 feet elevation, 5 August 1966, *Holmgren & Reveal 2957*. Holotype: US! Isotypes: BRY, NY, UTC! -- Distributed under the name *Eriogonum chrysops* Rydb.

*Eriogonum scopulorum* has been included previously under the definition of *E. chrysops* Rydb., a low, desert range species of southeastern Oregon. The exact nature of this species became obvious recently while preparing the description of *E. prociduum* Reveal (in press) which is found in extreme northeastern California and adjacent south-central Oregon. Once the true nature of *E. chrysops* was established, two additional elements came to light as well. These include *E. scopulorum*, as defined here, and a second species, yet to be described, from central Idaho eastward to the Bitterroot Range of the Idaho-Montana state line region. The plants from these high mountain ranges are currently being studied and the results will be presented in 1973.

From *Eriogonum chrysops*, *E. scopulorum* may be quickly distinguished by its glandular scapes and pale yellowish flowers. The scapes of *E. chrysops* are floccose to tomentose and the flowers are a bright yellow. In some respects, *E. scopulorum* is similar to *E. roseense* Nels. & Kenn. of the Sierra Nevada, but the involucre is totally different and the flower color and structure is not the same.

The series of species to which *Eriogonum argophyllum* and *E. scopulorum* belongs is still under study as more isolated species are being discovered; however, a key to the known elements is presented below. All of these entities have a membranaceous involucre tube.

A. Flowers yellow to pale yellow, not white or rose.

B. Scapes glandular; leaves (5) 6-9 (10) mm long, 2.5-4 mm wide, tomentose and glandular on both surfaces; flowers pale yellow, 2.5-3 (3.5) mm long, the tepals oblanceolate; involucre sparsely floccose and glandular or merely glabrous below and slightly pubescent near the teeth, 2.5-3 mm long; Wallowa Mountains, 8500 feet elevation.  
..... *E. scopulorum*

BB. Scapes floccose.

C. Flowers bright yellow, 2.5-3 mm long; leaves 1-2 cm long, white-tomentose and eglandular on both surfaces, mostly spatulate, the petiole 2-5 mm long; involucre 3-5 per head, 2.5-3 mm long; low desert ranges in southeastern Oregon mostly below 7000 feet elevation..... *E. chrysops*

CC. Flowers pale yellow; plants of Nevada.

D. Flowers pale yellow, becoming tinged with reddish-brown at maturity in some; leaves densely and evenly tomentose on both surfaces, eglandular, the blade 4-8 mm long, 2-5 mm wide, oblanceolate to elliptic, the petiole 0.5-1 (1.5) mm long and tomentose; involucre 5-7 per head, 2-2.5 mm long; crusted mineralized sand, Sulphur Hot Springs, Ruby Valley, Elko Co., Nevada, at about 6050 feet elevation..... *E. argophyllum*

DD. Flowers greenish-yellow to pale yellow, becoming tinged with red at maturity, 3-3.5 mm long; leaves densely tomentose below, less so and greenish above, eglandular, the blade 5-10 (15) mm long, (2) 3-6 mm wide, oblanceolate to elliptic, the petiole 4-12 (15) mm long; involucre mostly 3-5 per head, 3-3.5 mm long; limestone slopes and ridges, Ruby Mountains and East Humboldt Range, Elko Co., Nevada, from 9000 to 10,400 feet elevation..... *E. kingii*

AA. Flowers white to rose or red, not yellowish.

B. Flowers glandular, not glabrous; plants above 10,000 feet elevation.

C. Leaves 1-2 cm long, densely white-tomentose below, less so and white above; scapes 3-8 cm long, glandu-

lar, not floccose; inflorescences containing 5-7 involucre; pedicels glandular at the tip; granitic sand and rocky outcrops, White Mountains, east-central California and adjacent west-central Nevada, from 10,000 to 13,000 feet elevation.... *E. gracilipes*

CC. Leaves 3-10 mm long, densely white-tomentose and greenish below, less so and greenish above; scapes up to 3 cm long, floccose and glandular; inflorescences containing 2-4 involucre; pedicels glabrous except for a few scattered glands at the base; limestone and quartzite sand and rocky outcrops, Snake Range, east-central Nevada, from 10,000 to 12,000 feet elevation.  
..... *E. holmgrenii*

BB. Flowers glabrous, white or cream; leaves mostly spatulate and 1-2 cm long, densely white-tomentose on both surfaces; scapes floccose; inflorescences containing 2-5 involucre; clay slopes and hillsides, Grant and Powell cos., Montana, southwestwardly into Lemhi, Clark and Custer cos., Idaho, below 7000 feet elevation..... *E. mancum*

*Eriogonum tumulosum* (Barneby) Reveal, stat. nov.

*Eriogonum villiflorum* A. Gray var. *tumulosum* Barneby, Leaflet. Bot. 5:153. 1949.

Low pulvinate caespitose herbaceous perennials with several hundred rosettes of leaves, forming a rounded, hummock-like mound of matted caudex branches and leaves 1-4 dm across, the upper portion of the caudex branches clothed with old persistent leaves and petiole-bases, the lower portion bearing long strips of shaggy brown to reddish-brown bark, from a stout, woody gnarled taproot; leaves clustered, persistent, forming tuft-like rosettes, the leaf-blade oblanceolate to elliptic, 3-4 mm long, 0.7-1 mm wide, white- or greenish- silky-tomentose on both surfaces, the margin entire and plane to slightly thickened, the petiole short, 0.4-0.7 mm long, silky-villous, the petiole-base elongate, 1.2-1.8 mm long, 0.8-1 mm wide, thinly villous without, glabrous within; flowering stems scapose, 1-9 mm long, villous, usually obscured by the leaves, erect; inflorescences capitate, the head 5-8 mm across; bracts 4-5, semifoliateous, linear-lanceolate to lanceolate, 2.5-3.5 mm long, 0.3-0.4 mm wide, villous without, glabrous within, connate at the very base; peduncles lacking; involucre solitary, campanulate, 2-4 mm long, (4) 5-8 mm wide, villous without, glabrous within, the 7-10 lanceolate teeth 1.6-2.2 mm long, the bractlets few, oblanceolate, 2-2.5 mm long, fringed with long white cells, the pedicel short, 0.3-0.5 mm long, sparsely pubescent with scattered villous hairs; flowers white with a greenish or reddish margin, maturing rose or rustic, 3-4 mm long, densely pilose without except for the upper part of the tepals, sparsely pilose within, the tepals essentially similar, oblong to oblong-

oblanceolate, 0.8-1 mm wide, united at least 1/2 the length of the flower; *stamens* slightly exserted, 3-4 mm long, the filament glabrous, the anther reddish-yellow, 0.6-0.8 mm long, oblong; *achenes* light brown, glabrous, 1.8-2 mm long, the globose base tapering to a short, 3-angled beak.

TYPE: Sandstone ledges and rock-pavement on Red Plateau, southwest of Woodside, Emery Co., Utah, at 5200 to 5300 feet elevation, 13 June 1947, Ripley & Barneby 8678. Holotype: CAS! Isotypes: GH, NY, UTC!

DISTRIBUTION: Dry sandstone ledges and gravelly clay or rocky places of eastern Utah in Duchesne and Emery cos. Flowering from May to July.

The seemingly close relationship between *Eriogonum villiflorum* and *E. tumulosum* is offset by their very different habit of growth and geographical distribution. Unlike *E. tumulosum* which forms large mounds of several hundred closely associated rosettes of leaves with short, erect scapes topped with a capitate head of involucre, *E. villiflorum* is a small, low, prostrate plant with its ten to twenty loosely associated rosettes bearing a long, prostrate flowering stem topped by a compact umbellate-cyme of involucre. In the field, *E. villiflorum* is very easy to miss, as in most cases it is difficult to distinguish from the array of small rocks it so frequently grows with. *Eriogonum tumulosum*, on the other hand, is very obvious, and the very old, large mounds of dead leaves and detritus often resemble miniature pack-rat nests in the more open places among pinyon-juniper. Their geographical distribution is also distinct. *Eriogonum villiflorum* occurs from White Pine and Lincoln cos., Nevada eastward into western Utah from Beaver and Sevier cos. south to (apparently) Kane Co. where the type was collected but the plant not discovered since. *Eriogonum tumulosum* is found to the east of this range, across the Wasatch Mountains - a physical barrier that reaches elevations of more than 10,000 feet. Its range is from the benches around Duchesne eastward to near Myton in Duchesne Co., and then on the north end of the San Rafael Swells in Emery Co. This type of distribution pattern is seen in other groups, notable in *Astragalus*, *Penstemon* and *Townsendia*.

The three species which belong to this group can be distinguished as follows:

- A. Flowers white, becoming rustic or red in age, 3-4.5 mm long; involucre 6-8-lobed, 5-12-flowered.
- B. Plants loosely caespitose at full development and composed of 10-20 rosettes; flowering stems 2-5 (8) cm long, prostrate; inflorescences compact cymose-umbellate with several evident rays; gravelly and clay soils of western Utah in Beaver, Millard, Sevier and (apparently) Kane cos.

and in Lincoln and White Pine cos. of adjacent eastern Nevada..... *E. villiflorum*

- BB. Plants densely pulvinate and forming hemispheric mounds up to 4 dm across at maturity, with several hundred rosettes; flowering stems 1-9 mm long, erect; inflorescences capitate or essentially so; gravelly and clay soils in eastern Utah from Duchesne Co. south to Emery Co.....  
..... *E. tumulosum*

- AA. Flowers yellow, 1.8-2.3 mm long; involucre 4-lobed, solitary, sessile in the rosettes, 3-4-flowered; plants densely pulvinate and compact, 0.2-0.8 cm high; rare, endemic to red calcareous gravel ridges, Paunsagunt Plateau in Red Canyon and near Widtsoe, Garfield Co., Utah..... *E. aretioides*

*Eriogonum contiguum* (Reveal) Reveal, stat. nov.

*Eriogonum inflatum* Torr. & Frém. var. *contiguum* Reveal,  
Aliso 7:221. 1970.

Erect herbaceous annuals (0.3) 0.5-3 dm high arising from a slender, woody taproot; leaves basal, the leaf-blade mostly round to round-oblong, (0.3) 0.5-1 (1.4) cm long and wide, hirsute on both surfaces, greenish or yellowish, with longer and more numerous hairs along the margin and midvein, usually slightly less pubescent above than below, the margin entire and plane, the apex round, the base usually round, occasionally slightly cordate, the petiole hirsute, 0.4-1.5 cm long, the petiole-base triangular, 0.5-2 mm long, 0.5-1.5 mm wide, hirsute and minutely glandular without, glabrous within; flowering stems erect with 1-few stems, slender, glandular at the base, otherwise glabrous, dark green, up to 5 cm long; inflorescences densely paniculated-cymes, (0.2) 0.5-1.8 dm long, mostly trichotomously (occasionally more) branched at the first node, di- or trichotomous above, the secondary branches lacking or few in number at the first node, the branches slender and dark green, glandular at the nodes and along the lower portion of the branch, otherwise glabrous; bracts scale-like, ternate, triangular, 0.3-1.4 mm long, glandular without, glabrous within except for ciliated hairs at the apex and along the margin of the connate bract, connate at the base; peduncles capillary, ± erect and straight, 0.3-1.2 (2) cm long, glandular at the node, glabrous above, dark green to reddish; involucre turbinate, 1-1.3 mm long, 0.6-1 mm wide, glabrous within and without, the 5 (rarely 4) acute teeth 0.2-0.4 mm long, the bractlet lacking, the pedicel 1-1.6 mm long, glabrous; flowers golden-yellow with dark red to reddish-brown midribs and bases, usually becoming reddish at maturity, 1-1.3 (1.6) mm long, densely and conspicuously short-hirsute without with coarse, whitish-yellow, curved hairs, glabrous within except for minute glands along the midribs, the tepals essentially similar, lanceolate, united about 1/3 the length of the flower; stamens slightly exserted, 0.9-1.2 mm long, the fila-

ments glabrous, the anther yellow, 0.3 mm long, oval; *achenes* light brown, 1.5-1.8 (2) mm long, glabrous, the globose base tapering to a long, 3-angled beak.

TYPE: Large playas southeast of the junction of Nevada 10 and U.S. Highway 95, east of Ash Meadows, T.17S., R.51E., sec. 21, at 2250 feet elevation, Nye Co., Nevada, 3 June 1969, *Reveal & Matthews 2157*. Holotype: US! Isotypes: BRY, NY, UTC!

DISTRIBUTION: Dry desert flats and lower slopes in southwestern Nye Co., Nevada from Ash Meadows south to Pahrump Valley, hence westward into eastern Inyo Co., California from north of Death Valley Junction southward to near Tecopa. Flowering from April to late June.

The elevation of this recently published variety of *Eriogonum inflatum* Torr. & Frém. to the species ranks comes after an additional two years of field work. My early conclusion was based on the supposed strength of the 5-tooth involucre which is so typical of *E. inflatum* and the fact that annuals are a part of the species (ie., var. *fusiforme* of Utah and Colorado). Field work in southern Nevada and adjacent California conducted in the springs of 1970 and 1971 concentrated in those areas where *E. inflatum*, *E. contiguum* and *E. trichopes* Torr. could be found growing together. In these places, all three could be distinguished. Naturally, the line of demarcation between *E. inflatum* and *E. contiguum* was easy to draw, but that between *E. contiguum* and *E. trichopes* was much more difficult. For the most part, the number of teeth on the involucre held, but as more and more plants were studied, it became obvious that an occasional involucre on *E. contiguum* would be four-toothed although the majority of involucres on the same plant had five-teeth. The same held true for *E. trichopes*, with a few plants too having four and five toothed involucres on the same plant.

In the field studies, one aspect was confirmed. In general, *Eriogonum contiguum* is glandular whereas *E. trichopes* is glabrous throughout. Also, the branches of the first species are usually reddish while those of the second species are usually yellowish-green - a feature that can quickly separate the two entities in the field even from a distance. It seems clear from the above investigations, that it is impossible to hold *E. contiguum* within *E. inflatum*, and the only recourse is to elevate it to the specific rank.

The differences between the various species associated with *Eriogonum inflatum* can be separated as follows:

- A. Involucres 5-lobed; plants annual or perennial with an open inflorescence, the lower nodes with 3-5 branches, the upper ones di- or trichotomous; flowers yellow, 1-3 mm long; central



Baja California northward into the western United States.

- B. Plants glabrous and glaucous, annual or perennial, up to 10 dm high; involucre mostly 1-1.5 mm long; flowers 1.5-3 mm long; stems often inflated..... *E. inflatum*
- BB. Plants glandular, strictly annual, up to 3 dm high; involucre 1-1.3 mm long; flowers 1-1.3 (1.6) mm long; stems not inflated..... *E. contiguum*
- AA. Involucres 4-lobed; plants with verticillated whorls at each node, sometimes densely so.
- B. Peduncles 3-15 mm long; leaves pilose to hirsute on both surfaces.
- C. Plants perennial, 2-10 (20) dm high with the inflorescence composed of verticillated cymes of 6-30 radiating, rigid, secondary branchlets; leaves pilose and crispate-undulate; central Baja California..... *E. pilosum*
- CC. Plants annual, 1-4.5 (6) dm high with the inflorescence composed of paniculated cymes with 5-20 radiating secondary branchlets at the lower nodes; leaves hirsute and entire or merely crenulate; northern Baja California and Sonora, Mexico, into the western United States..... *E. trichopes*
- BB. Peduncles lacking or 1-4 mm long; leaves glabrous or short-hirsute on both surfaces.
- C. Plants perennial; peduncles 1-4 mm long; flowers yellowish but becoming reddish, densely hirsute without; leaves glabrous, ciliate; involucre 1.2-1.7 mm long; west-central Baja California. *E. scalare*
- CC. Plants annual; peduncles lacking; flowers white to pink, becoming reddish, strigillose without; leaves short hirsute, not ciliate; involucre 0.4-0.7 mm long; Cedros Island and Vizcaino Desert, Baja California..... *E. intricatum*

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#### LITERATURE CITED

- BARNEBY, R.C. 1949. *Eriogonum villiflorum* and its near relatives in the Great Basin. *Leafl. W. Bot.* 5: 151-154.
- CRONQUIST, A., A.H. HOLMGREN, N.H. HOLMGREN & J. L. REVEAL. In press. *INTERMOUNTAIN FLORA: THE VASCULAR PLANTS OF THE INTERMOUNTAIN WEST. Volume 1. Introduction and Vascular Cryptogams.* New York.
- JONES, M.E. 1903. *Eriogonum*. *Contr. W. Bot.* 11: 4-18.
- REVEAL, J.L. In press. Two new species of *Eriogonum* (Polygonaceae) from California and adjacent states. *Aliso*.